

DRIVING CONTROL SYSTEM Installation Manual

- DCS-300 WITH FLOWSENSOR
- DCS-320 WITH FLOWSENSOR
- DCS-310 WITH EFI
- DCS-330 WITH EFI
- DCS-340

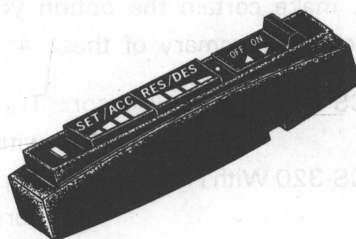


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1.0 INTRODUCTION

We believe your driving control system will mount on and function on most vehicles, foreign or domestic, or manual transmission. This includes passenger cars, light and heavy trucks, vans and recreational vehicles.

The DCS (Driving Control System) product is designed with 4 options, to accommodate differences in customer need and vehicle design. Before you begin installation, make certain the option you have purchased fits both your needs and your vehicle. A summary of these 4 options is listed below:

- DCS-300 With Flowsensor: Trip Computer and Integral Cruise Control for vehicles with normally carbureted engines.
- DCS-320 With Flowsensor: Trip Computer only for vehicles with normally carbureted engines.
- DCS-310 EFI : Trip Computer and Integral Cruise Control for vehicles with electronic fuel injection systems.
- DCS-330 EFI : Trip Computer only for vehicles with electronic fuel injection systems.

The following is a partial list of vehicles using Electronic Fuel Injection (EFI). If you do not see your car listed or if you are uncertain, consult your car owner's manual, or car dealer.

- All late model G.M. vehicles using throttle body injection.
- Datsun 280X, 300ZX, 200SX, and some Maximas.
- Toyota Supra and some Cressidas.
- All BMWs except 3201.
- Chrysler and Ford vehicles with throttle body injection.

Speed pulse generator kit, # AA147

A speed pulse generator kit, # AA147, is available as an option for use instead of the magnets and speed coil supplied. This may be a convenient option for some installations on Front Wheel Drive vehicles or with enclosed drive shaft areas.

NOTE: This installation manual is intended for use with all different DCS models. If your model does not include any of the described features, then skip the section that does not apply to your unit.

2.0 TOOLS REQUIRED

The following is a list of tools that will be required to install this unit properly on your vehicle:

- a. A socket set or a set of hand wrenches
- b. Screwdrivers
- c. Pliers
- d. Hammer
- e. Center punch
- f. Electric drill
- g. Drill bits, sizes 1/8" (3.1 mm), 3/16" (5mm) and 1/2" (13mm).
- h. Jack
- i. Two jack stands
- j. 12-volt test light
- k. Bench vise
- L. Small tubing cutter

Note: All of these items with exception of the test light are commonly found around most "do-it-yourselfers" homes. If you don't have a test light, we would suggest that you purchase one.

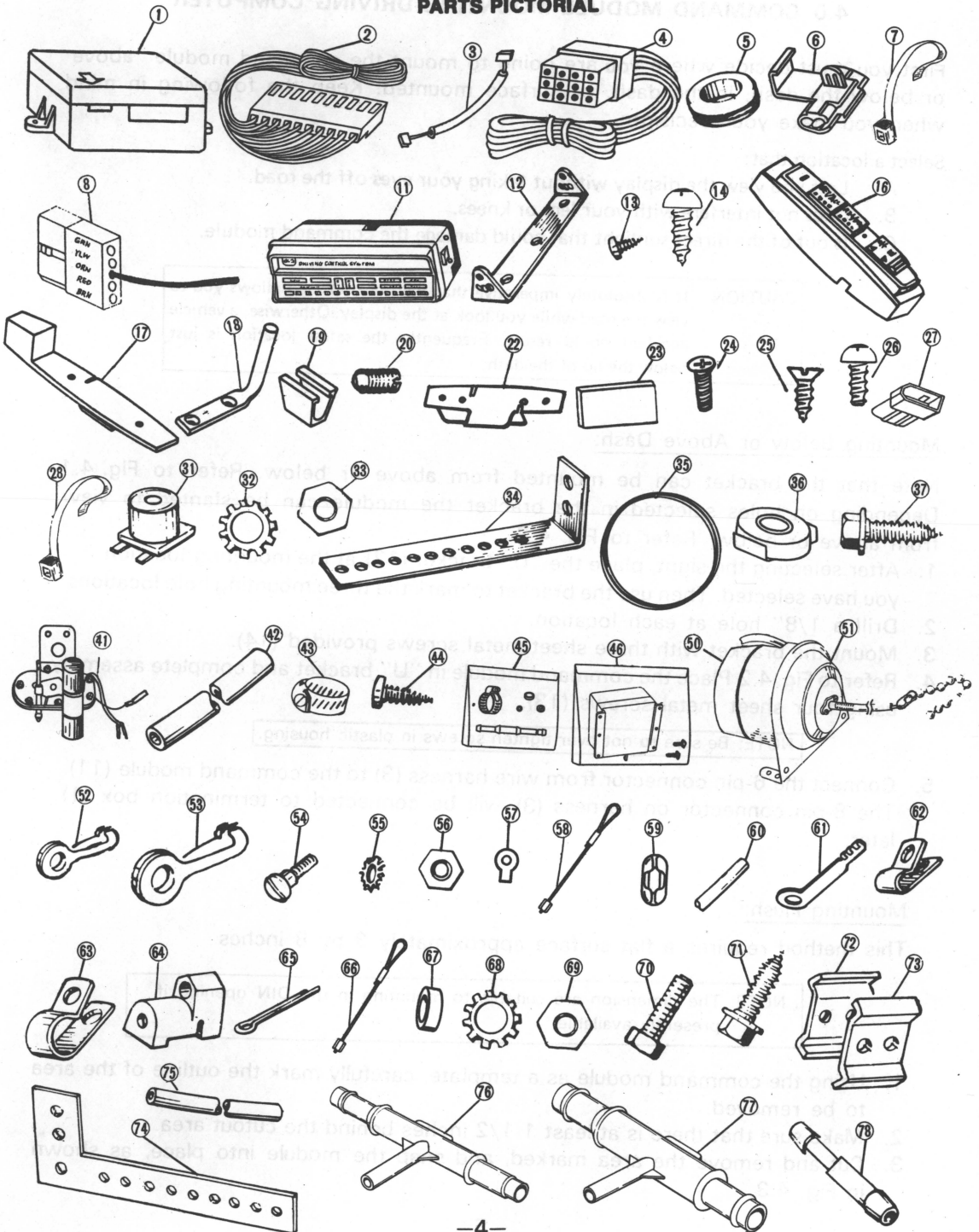
Now it's time to familiarize yourself with the parts in the kit. An illustration of all the parts and a parts list to use in checking the contents of the kit follows:

PARTS LIST

QUANTITY

Item	P/N	DESCRIPTION	DCS-300W	DCS-320W	DCS-310W	DCS-330W
			FLOWSENSOR	FLOWSENSOR	EFI	EFI
1.	6660	Termination Box	1	1	1	1
2.	7256	Wire Harness (10 pin)-Driving Computer	1	1	1	1
3.	7257	Wire Harness (8 pin)-Driving Computer	1	1	1	1
4.	7263D	Wire Harness (15 pin)-Cruise Control	1	1	1	1
5.	1163	Rubber Grommet	1	1	1	1
6.	7011	Wire Connector	6	3	6	3
7.	1142	Cable Ties (short).....	12	6	12	6
8.	3328	5 pin Connector Housing W/Orange Wire	1	1	1	1
11.	6622	Command Module-Driving Computer	1	1	1	1
12.	8740	"U" Bracket	1	1	1	1
13.	9675	2.6m/mx6m/m Sheet Metal Screw	4	4	4	4
14.	1129	No. 8x1/2" Sheet Metal Screw	5	5	5	5
16.	6569	Command Module Assy.-Cruise Control.....	1	0	1	0
17.	9943	Command Module Adaptor	1	0	1	0
18.	8670	Mounting Bracket	1	0	1	0
19.	9945	Piggy Back Adaptor	1	0	1	0
20.	9683	Set Screw M4x0.7x8	1	0	1	0
22.	8671	Mounting Stand	1	0	1	0
23.	9462	Two Sided Tape	2	0	2	0
24.	9617	Screw #2 x 3/8" Rnd Head, S/F Tap	2	0	2	0
25.	9620	Screw #6 x 5/16" Fit Hd., Phil, S/F Tap	2	0	2	0
26.	9619	Screw #6 x 5/16" Rnd Hd., Phil, S/F Tap	2	0	2	0
27.	6876	5 pin Connector Housing	1	0	1	0
28.	1646	Cable Tie (Long)	1	0	1	0
31.	1164	Speed Sensor.....	1	1	1	1
32.	1135	6m/m Lock Washer	1	1	1	1
33.	1114	6m/m Hex Nut	1	1	1	1
34.	1046	Speed Sensor Bracket	1	1	1	1
35.	3790	Stainless Steel Wire	2	2	2	2
36.	5901	Magnet with Protector	4	4	4	4
37.	1071	1/4" x 3/4" Sheet Metal Screw	2	2	2	2
41.	6481	Flowsensor Assembly	1	1	0	0
42.	1166	Fuel Line	1	1	0	0
43.	3754	Fuel Line Clamp-Screw	4	4	0	0
44.	1129	No.8 x 1/2" Long Sheet Metal Screw	2	2	0	0
45.	4792	Fuel Return Kit	1	1	0	0
46.	1282	Electronic Fuel Injection Kit	0	0	1	1
50.	6620	Electronics Module on Throttle Actuator	1	0	1	0
51.	6621	Throttle Actuator	1	0	1	0
52.	1137	Bead Chain Connector (5m/m)	1	0	1	0
53.	4558	Bead Chain Connector (9m/m)	1	0	1	0
54.	1265	4m/m Shoulder Screw	1	0	1	0
55.	3611	4m/m Lock Washer	1	0	1	0
56.	3612	4m/m Hex Nut	1	0	1	0
57.	5018	Ring Terminal-186A	1	0	1	0
58.	7773	Wire Looper (5 inches)	1	0	1	0
59.	4559	Bead Chain Coupling	1	0	1	0
60.	9406	Bead Chain Cover (1/2 inch)	1	0	1	0
61.	8717	3 Bead Connector	1	0	1	0
62.	1067A	3/16" Throttle Clamp	1	0	1	0
63.	1069A	5/16" Throttle Clamp	1	0	1	0
64.	1136	Ford Linkage Adaptor	1	0	1	0
65.	1075	Cotter Pin	1	0	1	0
66.	7742	Wire Looper (3 inches)	1	0	1	0
67.	9523	Rubber Ring	1	0	1	0
68.	1135	6m/m Lock Washer	3	0	3	0
69.	1114	6m/m Hex Nut	3	0	3	0
70.	4186	6m/m x 15m/m Machine Screw	5	0	5	0
71.	1071	1/4" x 3/4" Sheet Metal Screw	4	0	4	0
72.	3777A	Cable Throttle Clamp W/Thread	1	0	1	0
73.	3776A	Cable Throttle Clamp	1	0	1	0
74.	3780	Flexible Cable Bracket	1	0	1	0
75.	1079	Vacuum Hose (36 inches)	1	0	1	0
76.	1628	1/4" to 5/16" Vacuum Tee	1	0	1	0
77.	1629	3/8" to 1/2" Vacuum Tee	1	0	1	0
78.	1044	1/4" to 5/32" Vacuum Adaptor	1	0	1	0

PARTS PICTORIAL



4.0 COMMAND MODULE MOUNTING-DRIVING COMPUTER

First you must decide where you are going to mount the command module above or below the dash, in the dash, or surface mounted. Keep the following in mind when you make your decision:

Select a location that:

- A. Lets you view the display without taking your eyes off the road.
- B. Does not interfere with your legs or knees.
- C. Is out of the direct sunlight that could damage the command module.

CAUTION: It is absolutely imperative that the sight selected allows you to view the road while you look at the display. Otherwise, a vehicle accident could result. Frequently the safest location is just below the lip of the dash.

Mounting Below or Above Dash:

Note that the bracket can be mounted from above or below. Refer to Fig. 4.1 Depending on holes selected in the bracket the module can be slanted to view from above or below. Refer to Fig. 4.2

1. After selecting the sight, place the "U" bracket (12) at the mounting location you have selected. Then use the bracket to mark the three mounting hole locations.
2. Drill a 1/8" hole at each location.
3. Mount the bracket with three sheet metal screws provided (14).
4. Refer to Fig. 4.2 Place the command module in "U" bracket and complete assembly using four sheet metal screws (13).

NOTE: Be sure to not over tighten screws in plastic housing.

5. Connect the 6-pin connector from wire harness (3) to the command module (11). The 8-pin connector on harness (3) will be connected to termination box (1) later.

Mounting Flush:

This method requires a flat surface approximately 3 by 8 inches.

NOTE: The dimension are suitable to mounting in the DIN opening if presently available.

1. Using the command module as a template, carefully mark the outline of the area to be removed.
2. Make sure that there is at least 1 1/2 inches behind the cutout area.
3. Cut and remove the area marked, and snap the module into place, as shown in Fig. 4.3.

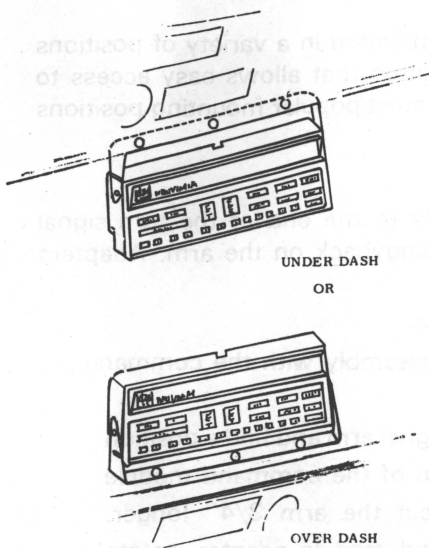
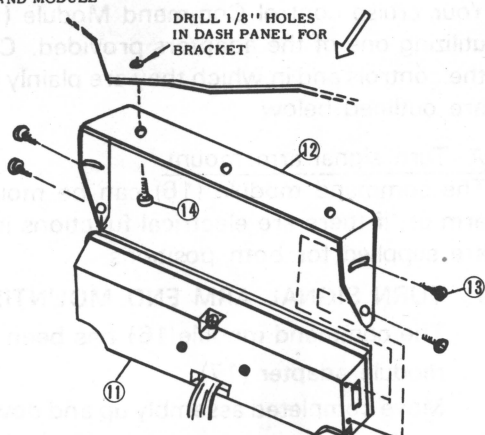


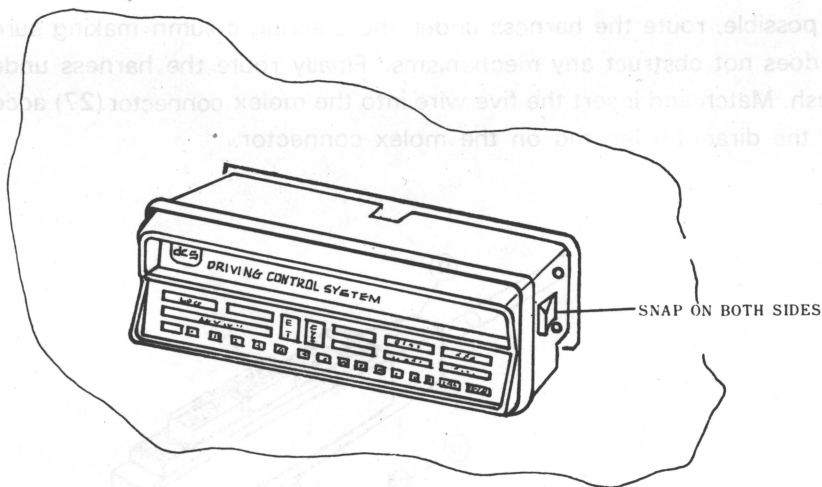
Figure 4.1

INSTALL "U" BRACKET ONTO
VEHICLE BEFORE MOUNTING
COMMAND MODULE



COMMAND MODULE BRACKET ASSEMBLY

Figure 4.2



MOUNTING FLUSH

Figure 4.3

4.1 COMMAND MODULE MOUNTING—CRUISE CONTROL

Your cruise control Command Module (16) can be mounted in a variety of positions utilizing one of the adapters provided. Choose a location that allows easy access to the controls and in which they are plainly visible. The most popular mounting positions are outlined below.

A. Turn signal arm mount

The command module (16) can be mounted directly to the end of the turn signal arm or, if there are electrical functions in the arm, piggyback on the arm. Adapters are supplied for both positions.

1. TURN SIGNAL ARM END MOUNTING—FIG. 4.4

The command module(16) has been factory preassembly with the command module adapter (17).

Move completed assembly up and down on turn signal arm and find a position that provides unobstructed viewing and activation of the command module controls. Mark the position on the arm and cut the arm $3/4''$ longer. Insert arm into hole in the end of the command module adapter, rotate module into desired position, and tighten set screw(20)in adapter using screw drivers.

Route wire harness down arm. Secure using wire ties or electricians tape. If possible, route the harness under the steering column making sure that it does not obstruct any mechanisms. Finally route the harness under the dash. Match and insert the five wire into the molex connector (27) according to the diragram located on the molex connector.

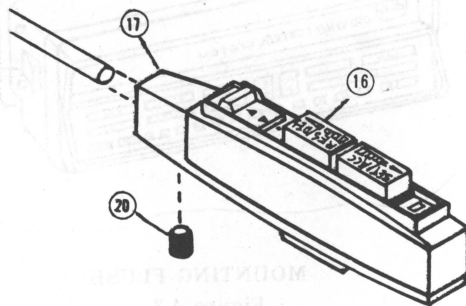


Figure 4.4

2. PIGGY BACK MOUNTING—FIG. 4.5

Insert set screw (20) into piggy back adapter (19). Do not tighten. Slip adapter over the turn signal arm, then slide grooves in module adapter base into piggy back adapter (see Fig. 4.5). Be sure grooves are properly engaged. Move command module to desired position and tighten set screw. Route wire harness as described in turn signal arm end mounting.

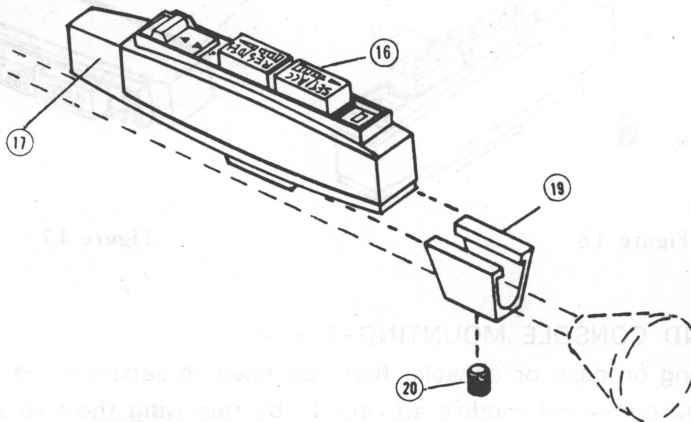


Figure 4.5

B. STEERING COLUMN MOUNTING—FIG. 4.6

The command module can be mounted to the steering column using the module adapter (17) and the mounting bracket (18), see Fig. 4.6. Insert bracket into hole in the adapter. Position assembly on steering column cover in a location which provides unobstructed viewing and activation of the controls. Using the bracket as a template, mark hole position and drill two $\frac{3}{32}$ " dia. holes. Be careful not to drill into the steering column, turn signal mechanism, or wiring. Use two #6x5/16" flat head screws (25) to attach mounting bracket. Rotate module on bracket to desired position and tighten set screw (20) using screw drivers.

Route wire harness as described in turn signal arm mount.

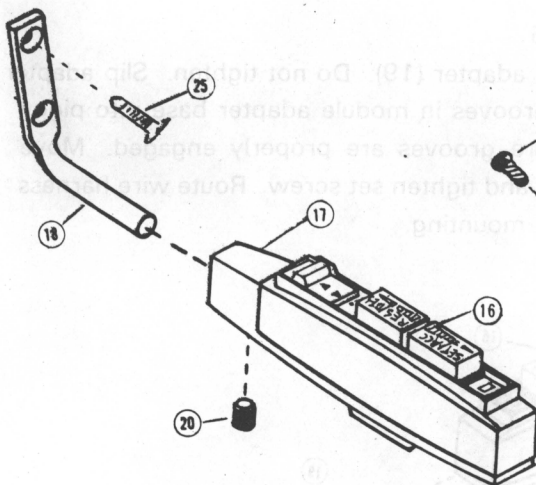


Figure 4.6

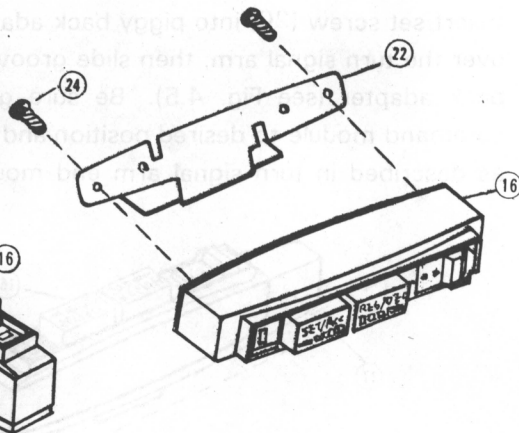


Figure 4.7

C. DASH AND CONSOLE MOUNTING—FIG. 4.7

When mounting on dash or console, first you need to separate the command module(16)and command module adapter(17)by removing the two screws on the back of command module adapter(17). Do not use module adapter(17). Attach command module and its rear cover directly to mounting stand(22), see Fig. 4.7. Route wire harness through slot in stand and secure stand to module using two short # 2x3/8" screws(24).CAUTION: Do not use the original screws to attach stand. Stand may either be screwed to dash or console, or held in place with the supplied double stick foam tape (23).

Locate a position on the dash or console which provides an unobstructed view of the command module and which is within easy reach of the driver. When considering a location, keep in mind the routing of the wire harness. Change location if harness will not reach electronics module or if it interferes with other vehicle controls.

For screw on mounting, use the stand as a template, mark holes, center punch and drill two 3/32" dia. holes. Secure the stand and module using two #6x5/16" screws(26). Be sure that drilling will not interfere with wiring beneath the panel.

To secure the stand with double stick foam tape(23),remove the protective backing from one side and stick to bottom of stand. Peel off remaining backing and press stand into place.

Route wire harness as described in turn signal arm mounting.

5.0 TERMINATION BOX MOUNTING/PRELIMINARY WIRING

(See Page 26 for Wiring Diagram Fig. 9.1)

The purpose of the termination box (1) is to provide a space for 9V backup battery, and to offer mounting flexibility of the wire harness.

1. The termination box (1) is mounted inside the passenger compartment under the dash and provides access for backup battery replacement.
2. After the proper mounting position is selected, mount the termination box (1) by using two small sheet metal screws(14) provided.

NOTE: A 9V ALKALINE battery is recommended for backup battery usage. To open the box, insert a screwdriver into the OPEN slot, and gently open it. (See fig. 5.1)



Figure 5.1

3. Connect the 8-pin wire connector coming from the wire harness (3) to the 8-pin connector in the box.
4. Connect the 10-pin wire harness (2) to the 10-pin socket on the termination box. Be sure the connector is properly inserted into the termination box.
5. Locate a suitable existing hole (or drill a 1/2" (12.8mm) diameter hole through the firewall near the steering column for the wiring harness (2). If a hole is drilled, install the grommet (5) into this hole. Many times an existing hole or grommet for the speedometer cable may be used.

CAUTION: Be careful and do not drill into wires or vital parts on the opposite side of the firewall.

6. Route the BLACK pair of speedsensor wires through the grommet into the engine compartment and down toward the floor.
7. Route the Blue and the Orange, Gray, Gray Striped ribbon wires through the grommet into the engine compartment.
8. Attach the GREEN wire to chassis ground.
9. The RED and ORANGE wires will be connected later.

6.0 SPEEDSENSOR INSTALLATION—DRIVE SHAFT

The purpose of the speedsensor coil (31) is to provide the command module with speed pulses to obtain distance driven and miles per hour.

NOTE: Only two magnets are required, when mounting speed sensor on drive shaft.

1. Block both front wheels.
2. Place the transmission in neutral, being sure that the handbrake is disengaged.
3. Jack up the rear of the vehicle so that there is adequate room to work comfortably in the drive shaft area.
4. Support the vehicle on jack stands under the axle.

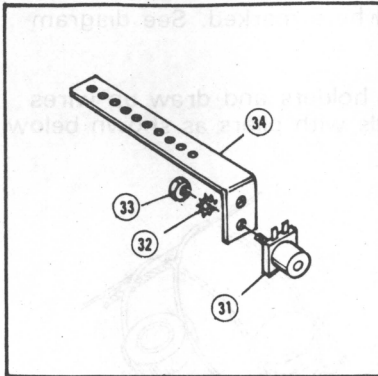
WARNING: Never get under a vehicle supported only by a jack. Many injuries result from vehicles falling off jacks. Before working underneath vehicle, support solidly with jack stands.

5. Refer to Figure 6.1: Assemble coil (31) and bracket (34) together in hole best suited to your auto, using nut (33) and lockwasher (32). Position the coil so the terminals will point up.
6. Refer to Fig. 6.3, 6.4 and 6.5: Place the bracket assembly against the floor pan as close to the front universal joint as possible. Do not exceed 12" (30.5cm) from this universal joint or damage may result to magnets or coil from side movement of drive shaft. Position the bracket to obtain 5/8" (16 mm) clearance between the coil and drive shaft.
7. Use the bracket as a template and mark two hole locations. Then drill two 3/16" diameter holes. Mount the bracket with two 1/4" x 3/4" long sheet metal screws (37).
8. The next step will be to install the magnets on the drive shaft.

CAUTION: Remove your wrist watch while working with the magnets.

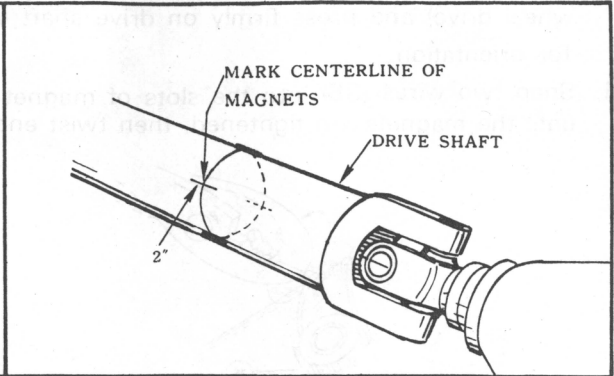
9. Clean the magnet mounting area using a wire brush or coarse sand paper. Refer to Fig. 6.2 and 6.3: With a pencil, using the center of the speedsensor coil as a guide, rotate the drive shaft and mark a line where the magnets (36) are to be located. Using the knuckles of the universal joint as a guide, mark equally spaced magnet locations around the drive shaft. Be sure the mark extends beyond the length of the magnet. (Approximatley 2 inches long.)

FIGURES-DRIVE SHAFT



PICKUP COIL AND BRACKET ASSEMBLY

Figure 6.1



MARKING MAGNET LOCATION

Figure 6.2

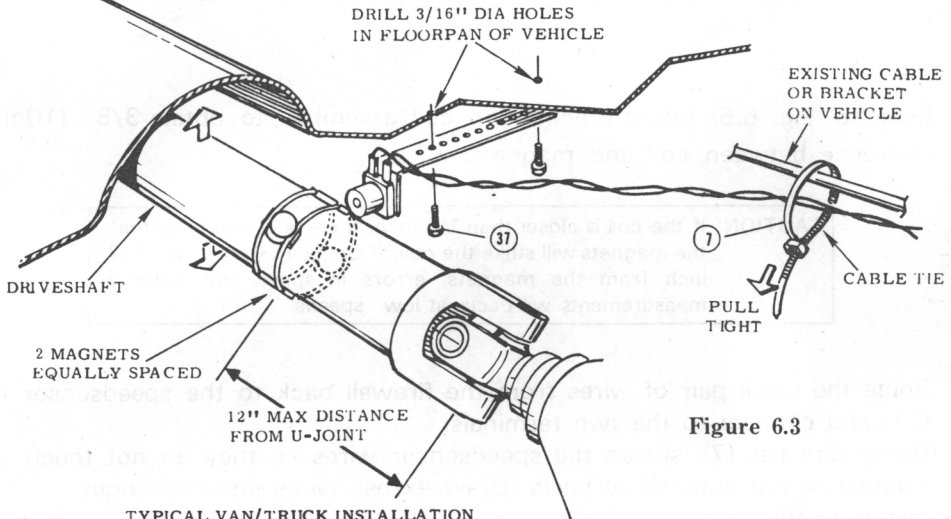


Figure 6.3

TYPICAL VAN/TRUCK INSTALLATION

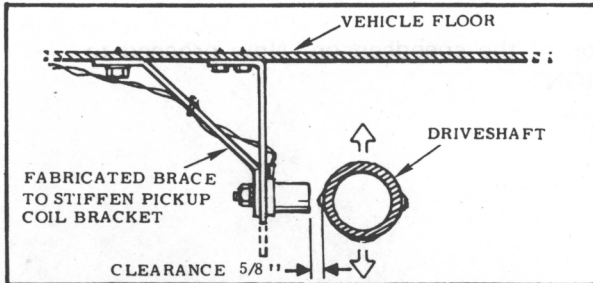


Figure 6.4

SPEEDSENSOR INSTALLATION

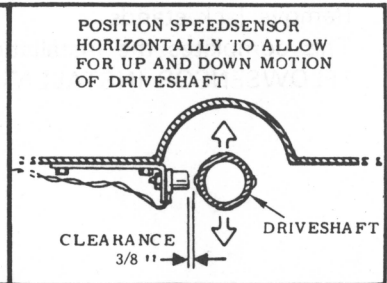
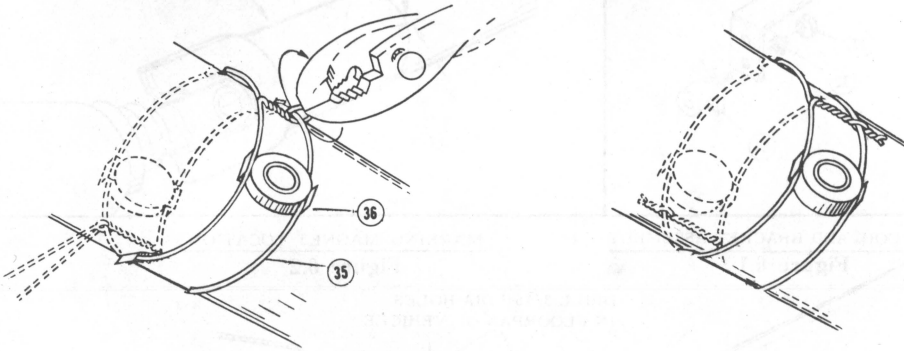


Figure 6.5

10. Remove paper from adhesive of the two magnets (36) (four for front wheel drive) and press firmly on drive shaft where marked. See diagram for orientation.
11. Snap two wires (35) into the slots of magnet holders and draw up wires until the magnets are tightened, then twist ends with pliers as shown below.



12. Refer to Fig. 6.5: Adjust bracket and coil assembly to obtain $3/8''$ (10mm) clearance between coil and magnets.

CAUTION: If the coil is closer than $1/4$ inch, there is a possibility that the magnets will strike the coil. If the coil is more than $1/2$ inch from the magnets, errors in speed and distance measurements will occur at low speeds.

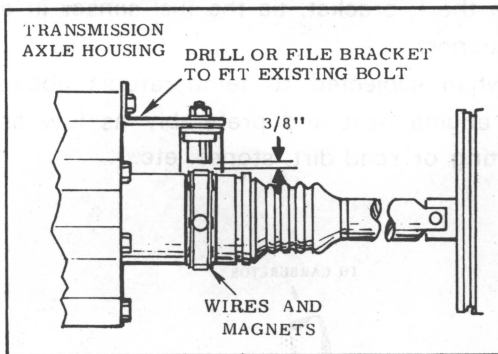
13. Route the black pair of wires from the firewall back to the speedsensor coil (31) and connect to the two terminals.
14. Using wire ties (7), secure the speedsensor wires so they do not touch any rotating or hot automobile parts. Draw excess wires into passenger compartment.
15. Remove jack stands.
This completes the installation of the speedsensor. Now proceed to "FLOWSENSOR INSTALLATION".

6.1 SPEEDSENSOR INSTALLATION—FRONT WHEEL DRIVE

1. Review Figures 6.6 & 6.7 to determine which mounting you are going to use.
2. Jack up the side of the car on which you are going to install the sensors and remove the wheel to facilitate installation.

WARNING: Never get under a vehicle supported only by a jack. Many injuries result from vehicles falling off jacks. Before working underneath vehicle, support solidly with jack stands.

3. Form the speedsensor bracket (34) to mount on an existing bolt or transmission axle housing (left or right side) so that you have approximately 1 1/2" (3.8 cm) between the magnet mounting surface and the bracket. Refer to Figure 6.8.
4. Refer to Figure 6.9. Insert the speedsensor (31) into the hole of the speedsensor bracket (34) and assemble with lockwasher (32) & nut (33). Do not tighten.
5. Refer to Figure 6.8. Align bracket and tighten speedsensor in place leaving 5/8" (16mm) clearance between the sensor and driveshaft.
6. Continue with steps 9 thru 15 on page 11 to install the magnets and wires.



FOREIGN TYPE VEHICLES

Figure 6.6

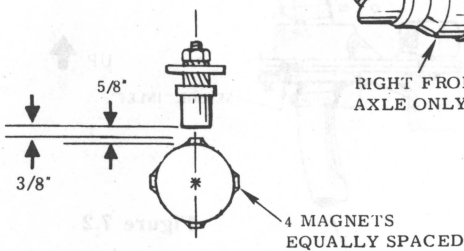


Figure 6.8

FIGURES—FRONT WHEEL DRIVE

Figure 6.7

CADILLAC ELDORADO
OLDSMOBILE TORONADO
BUICK RIVIERA

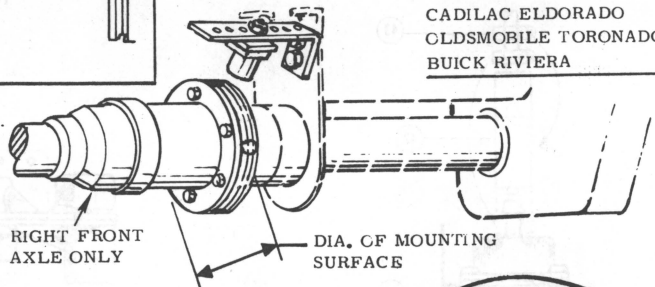
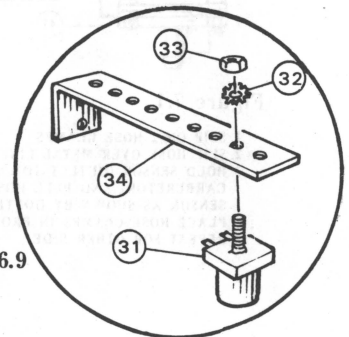


Figure 6.9



7.0 FLOWSENSOR INSTALLATION

The flowsensor must be mounted (if possible) between fuel pump and carburetor with the fuel passing through it vertically bottom to top (soft plastic cover down, and wire connectors up).

If your vehicle does not have any fuel return lines from the fuel pump to the tank, and if no space exists to install between fuel pump and carburetor, the sensor can be installed between pump and tank; however accuracy and hot weather performance will be decreased.

NOTE: For Fuel Return Line equipped vehicles, parts and instructions are supplied in the hardware bag.

The flowsensor is provided with an L bracket which when mounted on a vertical surface, gives proper orientation or bend to suit. However if a suitable surface is not close at hand, additional fuel hose will have to be purchased from a local automotive store. If you are unable to utilize the L bracket, tie the fuel sensor in a preferred orientation and provide physical support.

The flowsensor is susceptible to failure when subjected to temperatures above 200°F (100°C). Try to locate away from engine heat and preferably as low as possible (heat rises), but not subject to wetting or road dirt, stones, etc.

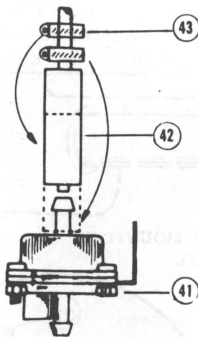


Figure 7.1

1. SLIP ON 2 HOSE CLAMPS
2. SLIP HOSE OVER METAL LINE
3. HOLD SENSOR (OUTLET TOWARD CARBURETOR) AND PULL HOSE OVER SENSOR AS SHOWN BY DOTTED LINES.
4. PLACE HOSE CLAMPS IN PROPER POSITION
5. REPEAT FOR OTHER SIDE.

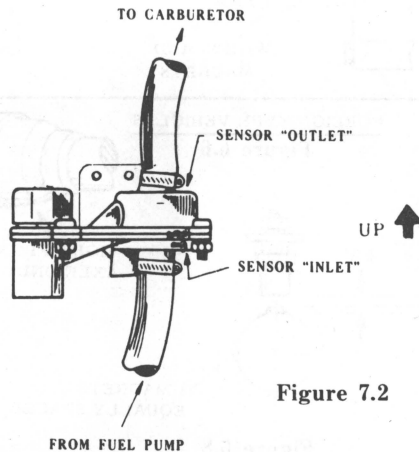


Figure 7.2

PREFERRED MOUNTING ORIENTATION
MUST BE USED ON ALL CARS WITH
HIGH MPG.

FLOW SENSOR INSTALLATION

Mounting On Rubber Hose Fuel Line:

1. Select a location in the fuel line that provides optimum orientation
Cut the rubber hose. Be prepared for gasoline spillage. Clean up fuel spillage before continuing.
2. Slide a hose clamp (43) on each end of the cut hose. Then, slide the hose ends over the ends of the flowsensor inlet and outlet as shown in figure 7.2. Be sure that the fuel enters from the fuel pump into the flowsensor inlet, and that the outlet feeds the carburetor.

IMPORTANT: The flowsensor will not function if installed backwards.

3. Continue with steps 6 thru 12 on page 17 to install the flowsensor.

Mounting Flowsensor in a Metal Line:

1. Select a location in the fuel line that provides proper orientation, see Figure 7.1 Be sure that the flowsensor is to be located beyond any return lines.
2. Mark the fuel line where the fuel line is to be cut.

SUGGESTION A small tubing cutter works best. If there is not enough room around the tubing for the tubing cutter to rotate around the tubing, the fuel line will have to be removed from the vehicle. Often, removing one end of the line will provide sufficient clearance to rotate the cutter. If a tubing cutter is not available, you can use a hacksaw, but the fuel line must be removed from the engine, so that the line can be blown clean of any hacksaw filings. **DO NOT** use a hacksaw while the fuel line is on the vehicle. The saw filings may damage the carburetor.

3. Cut the fuel line where marked. It may be necessary to remove a 3" (7.6cm) section of line for insertion of flowsensor if tubing cannot be spread by this amount.
4. Refer to Figure 7.1: Slide two fuel line clamps (43) over each end of the metal fuel line.
5. Install the flowsensor into the fuel line by cutting the rubber fuel line (42) into two pieces. Be sure that the fuel enters the inlet side of the flowsensor, from the fuel pump and the outlet feeds the carburetor

IMPORTANT: The flowsensor will not function if installed backwards

NOTE: The 5/16" rubber hoses provided will fit over 3/8" fuel line, but will be a tight fit. Place a small amount of lubricant on the fuel lines to ease installation. Do not allow excess lubricant to get inside the fuel lines.

6. Position and tighten clamps.
7. If flowsensor needs additional support, attach a wire to L bracket.
8. Route gray pair with stripe and orange wires to the flowsensor. Connect the orange wire from the termination box to the orange wire coming from the flowsensor.
9. Connect the striped wire to the striped wire coming from the flowsensor marked striped.
10. Connect the gray wire to the gray wire coming from the flowsensor marked gray.
11. Attach the green wire from the flowsensor to chassis ground.
12. Draw excess wire into passenger compartment and secure routing with wire ties (7).

Testing Of The Flowsensor:

1. Position the wire coming from the flowsensor so it will not be caught in any moving parts when you start the engine.

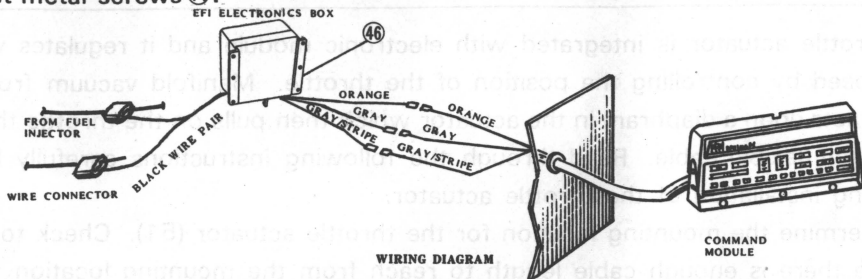
WARNING: Before you start the engine in the next step, make sure you have adequate ventilation. Exhaust gases are deadly. Do not run the engine in a closed garage.

2. Start the engine and inspect all the connections for fuel leaks.
3. Shut off the engine and proceed to next step.

WARNING: Engine should be run for several minutes to be sure there is no fuel leakage from either the flowsensor or the fuel connections.

7.1 EFI INSTALLATION INSTRUCTIONS

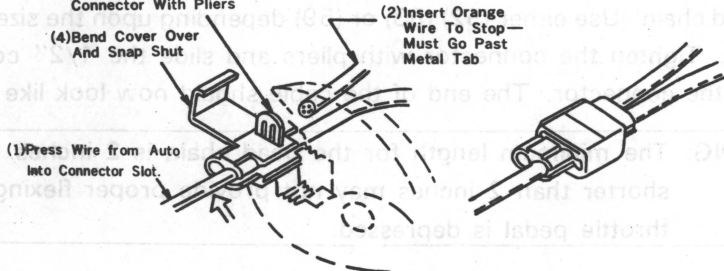
1. Select a location under the hood to mount the electronics box. It should be located away from engine heat and forward enough to receive cool air from the grill. On top or in front of the fender well is usually a good location.
2. Drill 1/8" (3.18mm) holes and secure the electronics box with at least two #8 sheet metal screws ⑭.



3. Locate the most accessible fuel injector solenoid. The injector can be identified as a one inch diameter 1-1/2 inch long cylinder. One end will be connected to a common fuel supply manifold, the other end will extend into the intake manifold very close to the cylinder heads. Attached to each injector (there is one injector for each cylinder) is a rectangular connector.
4. Remove the connector from the most accessible injector and slide back the rubber boot to expose the wires.
5. Route the black pair of wires from the electronics box to the injector connector.
6. Connect the black wires to the two wires on the injector using the two wire connectors supplied. See figure below. Re-install the connector on the injector.
7. Route the gray pair and orange wire from the command module to the electronics box.
8. Connect the gray stripe wire from the command module to the gray stripe wire from the electronics box.
9. Connect the gray wire from the command module to the gray wire from the electronics box.
10. Connect the orange wire from the command module to the orange wire from the electronics box.

To Splice With Blue Plastic Connector. Follow These Four Steps:

- (1) Press Wire from Auto Into Connector Slot.
- (2) Insert Orange Wire To Stop—Must Go Past Metal Tab.
- (3) Squeeze Tab Into Connector With Pliers.
- (4) Bend Cover Over And Snap Shut.



WIRE CONNECTOR INSTALLATION

8.0 THROTTLE ACTUATOR INSTALLATION

NOTE: Before throttle actuator installation, preset the "CYLINDER" and "SPEED SENSOR" select switches as described in the section 10.1 "CRUISE CONTROL INITIAL ADJUSTMENTS".

The throttle actuator is integrated with electronic module and it regulates vehicle road speed by controlling the position of the throttle. Manifold vacuum from the vehicle acts upon a diaphragm in the actuator which then pulls on the throttle through a 1 meter flexible cable. Read through the following instructions carefully before beginning installation of the throttle actuator.

1. Determine the mounting location for the throttle actuator (51). Check to make sure there is enough cable length to reach from the mounting location to the throttle linkage. Check cable routing to insure a minimum bend radius of 4 inches (8 inch circle). The throttle actuator is equipped with piggy back electronics module, which is susceptible to failure when subjected to temperature above 125°C (250°F). Try to mount the throttle actuator away from engine heat and preferably as low as possible (heat rises). A suitable location can usually be found on the firewall or a fender skirt. Also leave room to make sensitivity adjustments from the back.

CAUTION: Keep the cable away from hot or rotating surfaces.

2. Use the integral bracket as a template to mark and drill two 3/16" holes. Mount the throttle actuator using two 1/4" x 3/4" sheet metal screws (71).

CAUTION: Before drilling any holes, make sure there are no parts which may be damaged on the other side of the metal. Double check for any wiring harness which might be easily damaged by the drill bit.

3. Slide 1/2" cover (60) over the chain. Next attach a connector to the end of the bead chain. Use either (52) (53) or (59) depending upon the size of connector needed. Tighten the connector with pliers and slide the 1/2" cover over the end of the connector. The end of the cable should now look like Figure 8.1.

WARNING: The minimum length for the bead chain is 2 inches. Lengths shorter than 2 inches may not provide proper flexing when the throttle pedal is depressed.

CAUTION: The cable must pull in a straight line from the throttle attachment point.

4. Attach the cable connector to the throttle linkage. Determine a suitable point on the throttle linkage to mount the cable connector. Figures 8.2 thru 8.6 show several possible methods. The mounting point chosen should have between 1½" and 2" total travel and operate smoothly by hand. Attach the cable connector using parts shown in Figure 8.10.
5. Clamp the cable conduit. The outside conduit of the cable must be securely mounted for smooth cruise operation, but not tight enough to be crushed. Figures 8.7, 8.8, and 8.9 show several methods to mount the cable using parts shown in Figure 8.10. Before the cable is completely tight, remove the slack from the bead chain by adjusting the cable conduit. Make sure the throttle is at hot idle and not on a fast or cold idle step. When everything is tightened, there should only be a slight amount of slack in the bead chain.
6. Operate the throttle by hand and by the pedal to insure everything is operating smoothly and there is no possibility of the throttle being jammed or stuck open or closed.

WARNING: Your cruise control is designed with numerous safety features to insure safe operation, but none of these safety features can prevent a runaway condition caused by a jammed linkage or a crushed cable. Double check it!

7. Locate a 1/4 inch or larger non-restricted vacuum source from the intake manifold. Do not use a ported vacuum source such as a distributor advance or EGR. For smaller engines, the brake booster hose on the manifold side of the check valve may be the only suitable source.

NOTICE: On some vehicles, finding a vacuum source may be difficult. A good vacuum source may be verified by plugging it and starting the engine. With the engine at idle, unplug the source. The engine should either stall or run very rough. If it does not, the point selected is probably ported or restricted and will not provide proper cruise operation.

8. Cut the selected vacuum source and insert the correct size tee (76), (77), or adapter tee (78). If the brake booster hose was cut it is a good idea to secure the tee with two hose clamps.
9. Connect the 5/32" x 36" hose (75) to the tee. Route the hose to the actuator. Cut the hose to length and attach it to the actuator inlet.
10. Plug the 15-pin connector from wire harness (4) to the socket on actuator.
11. Connect the 3-pin connector from wire harness (4) to the 3-pin connector on actuator.
12. Route the remaining 5 colored ribbon wires, 3-pin connector and two brown wires labeled brake switch through firewall and into passenger compartment. These wires will be connected later.

CAUTION: When installing the throttle actuator, be sure to reconnect any hoses or wires which were disconnected during installation. Disconnected hoses could result in engine damage or increased vehicle emissions.

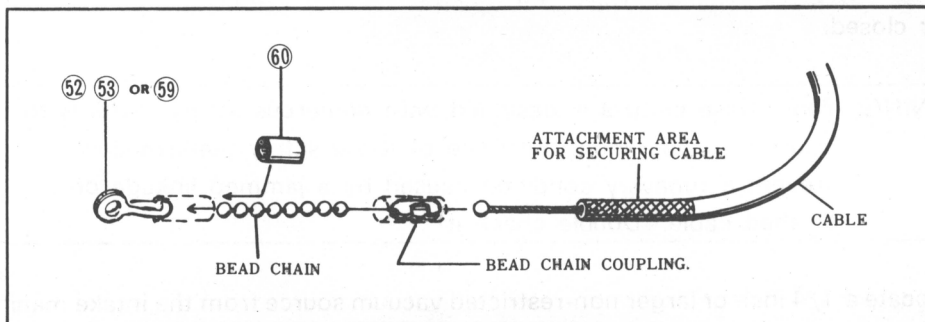


Figure 8.1
CABLE END ASSEMBLY

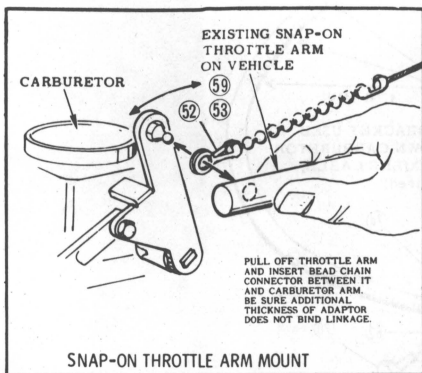


Figure 8.2

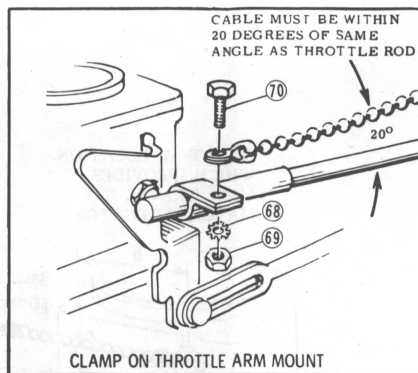


Figure 8.3

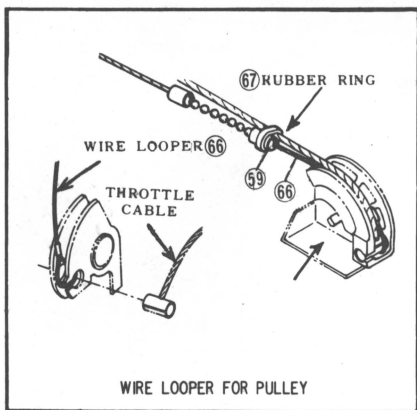


Figure 8.4

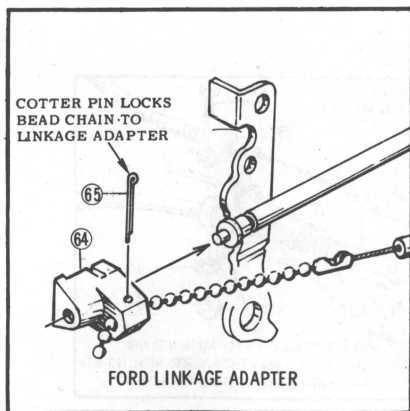


Figure 8.6

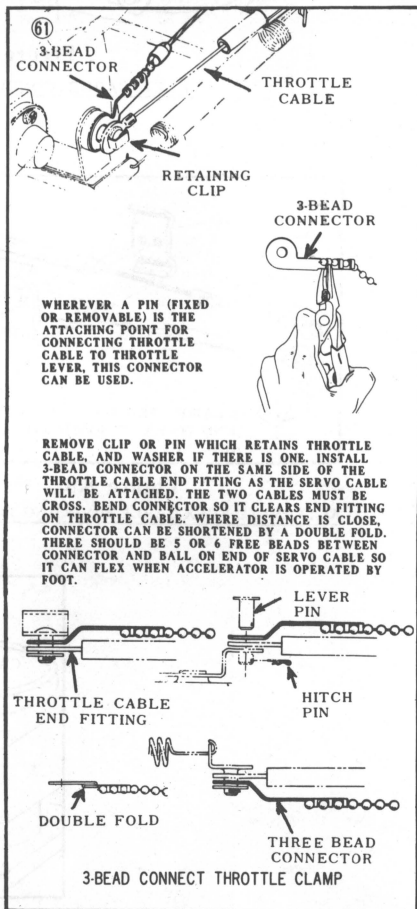


Figure 8.5

THROTTLE LINKAGE ATTACHMENTS

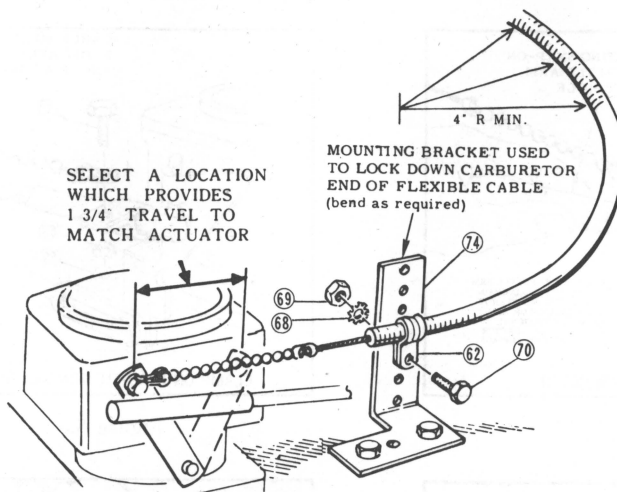


Figure 8.7

FLEX CABLE CONDUIT MOUNTING

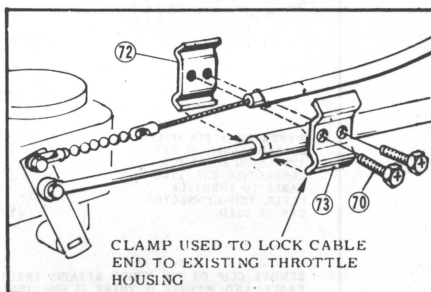


Figure 8.8

ALTERNATE FLEX CABLE MOUNTING TECHNIQUE

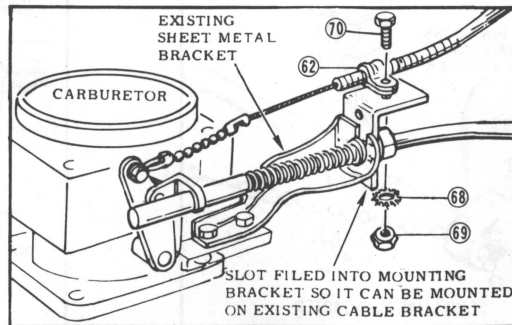


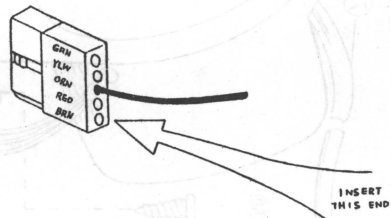
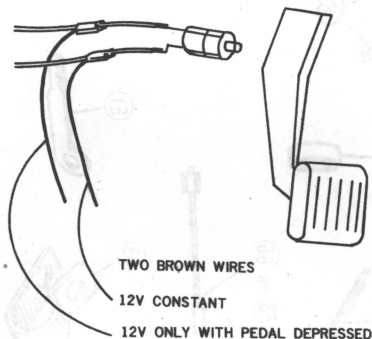
Figure 8.9

ALTERNATE FLEX CABLE MOUNTING TECHNIQUE

—24—

9.0 FINAL WIRING

1. Refer to the wiring diagram. (Figure 9.1 Page 26).
2. Using your test light, locate a 12 volt power wire or source at the fuse block which is "hot" when the key is turned on and "hot" when the key is off. A good source for this is the cigarette lighter. Mark this location "Hot Wire".
3. Using your test light, locate a 12 volt power wire or source at the fuse block which is "hot" when the key is on, "cold" when the key is off, and also "cold" when the key is in the start position. (This is typical of wires supplying voltage to accessories-radio, etc.) Mark this location "Accessory".
4. Now, under the hood of your car, find a wire which goes to the parking lights. Make sure this is not a turn signal wire.
(should be hot when headlights are on high or low beam.)
5. Route the blue wire from the firewall over to the parking light wire and connect the two using a blue wire connector (6). The illustration on Page 18 shows how to use the connectors.



6. Locate the negative "-" or "TACH" terminal of the ignition coil.
7. Connect the yellow wire to the "-" or "TACH" terminal using the push-on connector or a wire connector (6).
8. Locate the two wires coming from the vehicle brake switch. Attach the two large brown wires from the wiring harness (4) to the brake switch wires using wire connectors (6).
9. Check the brake switch connections with a voltmeter or a test light. One lead should be "always hot" and read 12 volts or light the lamp at all times. The other lead should be brake lamp power and read 12 volts or light when the brake pedal is depressed.

NOTE: Many later vehicles have multiple wires connected to the brake switch. Be sure to locate the proper wires as described above.

- 10 Use molex connector (8). Match and insert the four colored wires into the molex connector according to the diagram located on the molex connector. Connect the 5-pin connector from cruise control command module (16) to the 5-pin connector on wire harness (4).
11. Route the orange wire on molex connector to termination box (1) and connect this orange wire to the screwed terminal in termination box (1).
12. Connect the 3-pin connector coming from wire harness (4) to the 3-pin connector in the termination box (1).
13. Disconnect the battery ground cable.
14. Using a blue wire connector (6), attach the red wire to the "Hot Wire" wire (always "hot") marked in Step 2.
15. Using the remaining blue wire connector, attach the orange wire to the "Accessory" wire marked in Step 3.
16. Reconnect the battery ground cable.
17. Refer to wiring and installation diagram to double check all electrical and mechanical connections. Secure excess wire with wire ties (7).
18. Now proceed to Electrical and Safety checkout.

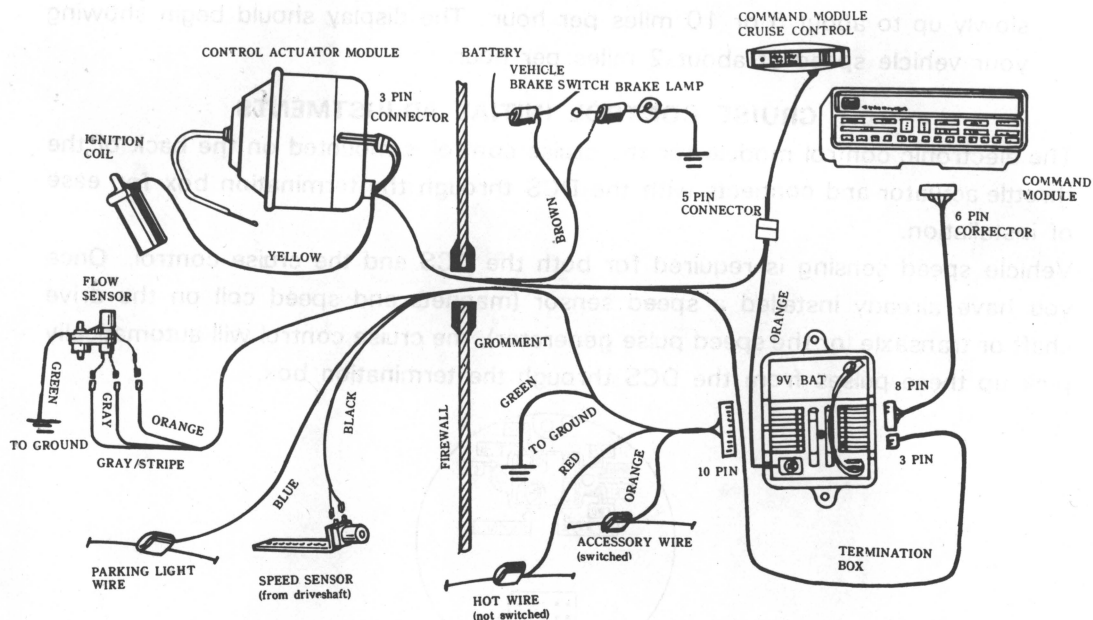


Figure 9.1 WIRING DIAGRAM

10.0 ELECTRICAL & SAFETY CHECKOUT

During the checkout procedure, if trouble is encountered, refer to the trouble shooting guide on page 29.

1. With the ignition switch off, verify display is off.
2. Turn on ignition switch. Verify the display shows 0:00. Press **SPEED**. the display should show 0. Turn ignition off. Verify display goes dark. Turn ignition back on again. Verify display still shows 0 not 0:00.
The next few steps verify that all the sensors operate properly.
3. Turn on the headlight switch. The keyboard on command module should light. Turn off headlights.
4. Press **FUEL** button. The display should show 0.0.
5. Start the engine and verify that the display begins to change showing the current fuel consumption. (This may take several seconds.)

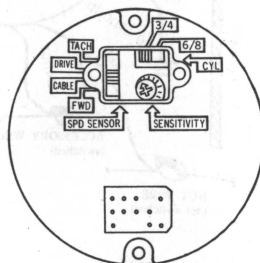
WARNING: Make sure you have adequate ventilation.
Exhaust gasses are deadly. Do not run the engine in a closed garage.

6. Press **SPEED**. The display should show 0. Put the car in gear and accelerate slowly up to about 5 or 10 miles per hour. The display should begin showing your vehicle speed at about 2 miles per hour.

10.1 CRUISE CONTROL INITIAL ADJUSTMENTS

The electronic control module for the cruise control is mounted on the back of the throttle actuator and connects with the DCS through the termination box for ease of installation.

Vehicle speed sensing is required for both the DCS and the cruise control. Once you have already installed a speed sensor (magnets and speed coil on the drive shaft or transaxle, or the speed pulse generator), the cruise control will automatically pick up these pulses from the DCS through the termination box.



ADJUSTMENTS:

The rubber plug on the back of the electronic module houses one speed sensor switch, one cylinder selection switch, and a sensitivity adjustment control.

IMPORTANT: The rubber plug must be pressed firmly back into place in order not to void the warranty.

1. SPEED SENSOR SWITCH:

Although the cruise control will operate in the TACH position (this senses engine RPM's from the ignition coil) you will have installed either magnets and speed coil or speed pulse generator for the DCS. Therefore, in most cases you will be using one of the other three positions:

- Drive Shaft use "DRIVE".
- Speed Pulse Generator in the speedometer cable-optional-use "CABLE".
- Front Wheel Drive use "FWD".

If you are installing magnets on the drive shaft or transaxle (FWD), select either "DRIVE" or "FWD", whichever is appropriate. If you are installing the optional Speed Pulse Generator # AA147 in the speedometer cable, select "CABLE".

2. CYLINDER SELECT SWITCH:

Choose the appropriate position for your vehicle—3 or 4 cylinders, or 6 or 8 cylinders. The cylinder select switch adjusts the Electronic Clutch Switch (ECS) circuit to your engine size. The ECS is a safety feature which disengages the cruise control when it senses sudden changes in engine speed. For example, this would occur when the clutch pedal is depressed or the transmission is shifted to neutral while the cruise control is engaged. Since the cylinder select also adjusts the speed pulse sensing, it is important to select the correct cylinder position.

3. SENSITIVITY:

Your cruise control comes preadjusted from the factory and should provide satisfactory performance. Further adjustments will be discussed in the road test section of the operating manual.

Your driving computer should now be functional. To obtain all of the functions, please proceed to the introduction section of operating manual. Also, refer to the operating manual for final adjustment and to fine tune your cruise control.

11.0 TROUBLE SHOOTING GUIDE—DRIVING COMPUTER

SYMPTOM	PROBABLE CAUSE	REMEDY
Display on all the time. (Step 1: Electrical and Safety Check-out)	<u>Orange</u> accessory wire connected to an always hot battery lead.	Connect the <u>orange</u> wire to accessory power; see wiring instructions. Page 26.
Display is dark when the ignition is turned on. (Step 2: Electrical and Safety Check-out)	Fuse blown in Termination box.	Check or replace fuse. (2 AMP)
	<u>Red</u> battery wire not connected to always "hot" power.	Recheck connections according to the wiring instructions. Page 26.
	10 pin or 8 pin wire harness not connected to termination box.	Check connection.
	Module not grounded	Check <u>green</u> wire from module for improper grounding
	<u>Orange</u> accessory wire not properly connected to accessory power.	Recheck connections according to the wiring instructions. Page 26.
Time and/or data is lost when ignition is turned off. (Step 2: Electrical and Safety Check-out)	<u>Red</u> battery wire connected to switched accessory power.	Reconnect <u>red</u> wire to always hot battery power. Page 26.
Time and/or data is occasionally lost.	Poor electrical connections. Weak battery or corroded terminals.	Recheck & repair <u>red</u> or <u>green</u> ground connections. Clean terminals and replace battery if necessary
	If your car has a long ground cable on the battery the voltage may be dropping below 5 volts for a fraction of a second when starting car.	Run <u>green</u> ground wire (18 Ga) from module directly to the negative terminal of the battery.

SYMPTOM	PROBABLE CAUSE	REMEDY
The COMPUTER does not respond properly to key-board commands or the display is blank.	The computer was not properly initialized.	Reset the computer by disconnecting & reconnecting the fuse in the termination box.
	The ignition is off.	Turn on the ignition.
Keyboard will not light when headlights are turned on.	Blue wire not properly connected	Connect blue wire to a source that is hot when headlights are on (parking lamps).
MPG and other fuel functions inoperative or erratic.	Incorrect flowsensor wiring.	Recheck the wiring according to the wiring instructions.
	Flowsensor installed backwards.	Reverse direction of flowsensor.
	Defective flowsensor or Defective command module	See testing FUEL mode below.
SPEED and other speed or distance functions inoperative or erratic.	Short or ground in speed sensor wiring.	Check & Repair <u>black</u> speedsensor wire.
	Speed sensor gap excessive or magnets improperly installed.	Set gap to 3/8" or 1/2" Check magnet installation correct, if required.
	Defective Speedsensor	Check continuity of speedsensor (500 ohms) Replace speedsensor.

TESTING FUEL MODE If there are no readings other than 0.0 when the engine is running and the command module is in the **FUEL** mode, either the command module or the flowsensor is defective. To determine which is at fault, disconnect the gray pair of wires from the wiring harness to the flow sensor (41) or (46). Using the two gray wires from the wiring harness, touch the ends together at a rate of approximately once per second. This should give a reading on the command module display. If there is no reading then the command module (11) is defective and should be returned for repair. If there is a reading then the flowsensor may be defective, and should be returned for repair.

11.1 TROUBLESHOOTING GUIDE—CRUISE CONTROL

Check "CYLINDER" and "SPD SENSOR" switches to be sure that they are set to the proper positions for your vehicle (refer to operating manual).

PROBLEM:

PERFORM THIS TEST:

- | | |
|---|--|
| 1. Cruise will not engage | A) Electronics module test
B) ECS test
C) Speedsensor test
D) Actuator test
E) Vacuum test
G) Brake wire test |
| 2. Cruise control erratic, surges or loses/gains speed after road test and adjustment | B) ECS test
C) Speedsensor test
D) Actuator test
E) Vacuum test
F) Cable test
H) Automatic transmission test |
| 3. Cruise lags or overshoots when engaged after sensitivity adjust | D) Actuator test
E) Vacuum test
F) Cable test |
| 4. Cruise disengages (Note: Carefully check all connections for intermittent wiring) | G) Brake wire test
D) Actuator test
E) Vacuum test |
| 5. Cruise accels too slowly after sensitivity adjust | D) Actuator test
E) Vacuum test |
| 6. Cruise will not disengage with brake | D) Actuator test
E) Vacuum test
F) Cable test |
| 7. Carburetor will not return to idle | F) Cable test
●) Check for broken throttle spring |
| 8. Cruise disengages when turn signal is on | G) Brake wire test |

12.0 TROUBLESHOOTING TEST—CRUISE CONTROL

A) ELECTRONICS MODULE TEST

Purpose: To determine if 12 volt power is getting to the electronics module.

DISCONNECT 3 PIN WIRE HARNESS CONNECTOR AT THROTTLE ACTUATOR AND SLIDE THE SWITCH ON CRUISE CONTROL COMMAND MODULE TO ON POSITION, IGNITION KEY TO ACC POSITION

MEASURE VOLTAGE ON RED WIRE IN 3 PIN CONNECTOR COMING FROM MODULE OR ORANGE WIRES ON TERMINATION BOX.
—USE A METER OR TEST LAMP. IF TEST LAMP APPEARS DIM OR METER SHOWS LESS THAN 12V WITH ALL ACCESSORIES ON, CHANGE ORANGE WIRE TO ANOTHER SOURCE

IS 12 VOLTS ON RED WIRE?

NO

REPLACE FUSE, CHECK 10 PIN, 5 PIN AND ORANGE WIRE CONNECTIONS

YES

IS GREEN WIRE CONNECTED TO GROUND?

NO

CONNECT OR RELOCATE GROUND

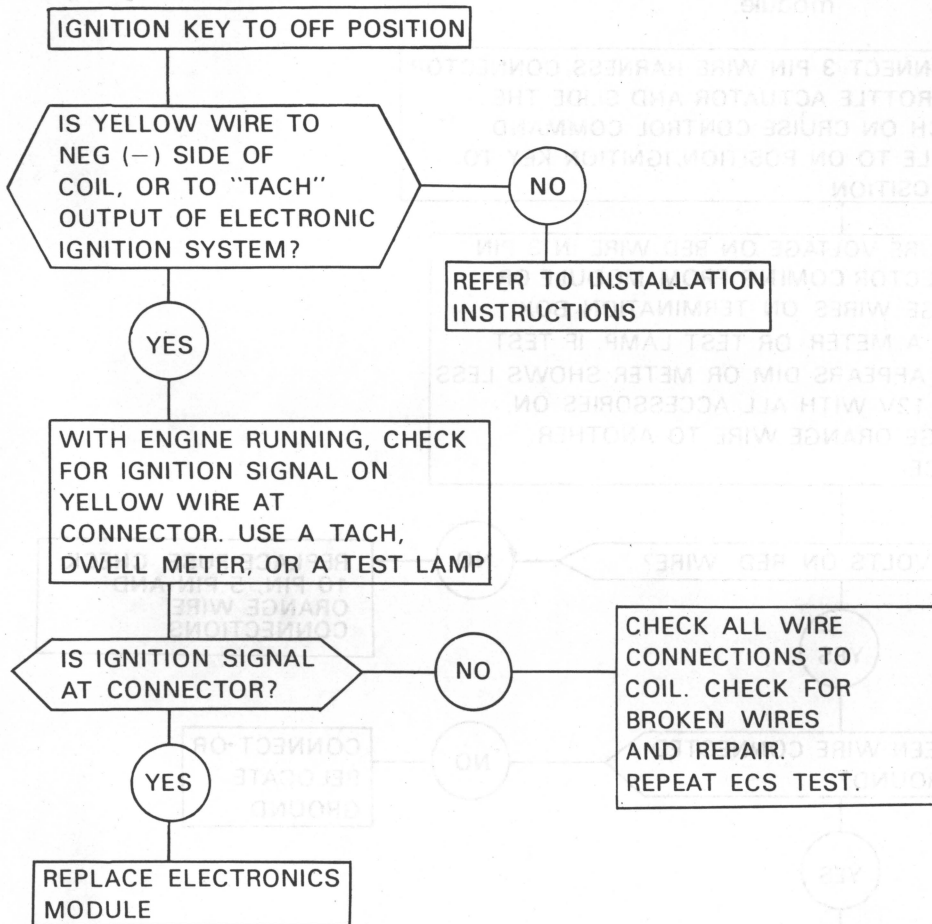
YES

MODULE POWER OK

TURN OFF IGNITION SWITCH. PLUG WIRING HARNESS TOGETHER TIGHTLY, MAKING SURE INDEX TABS LINE UP PROPERLY.

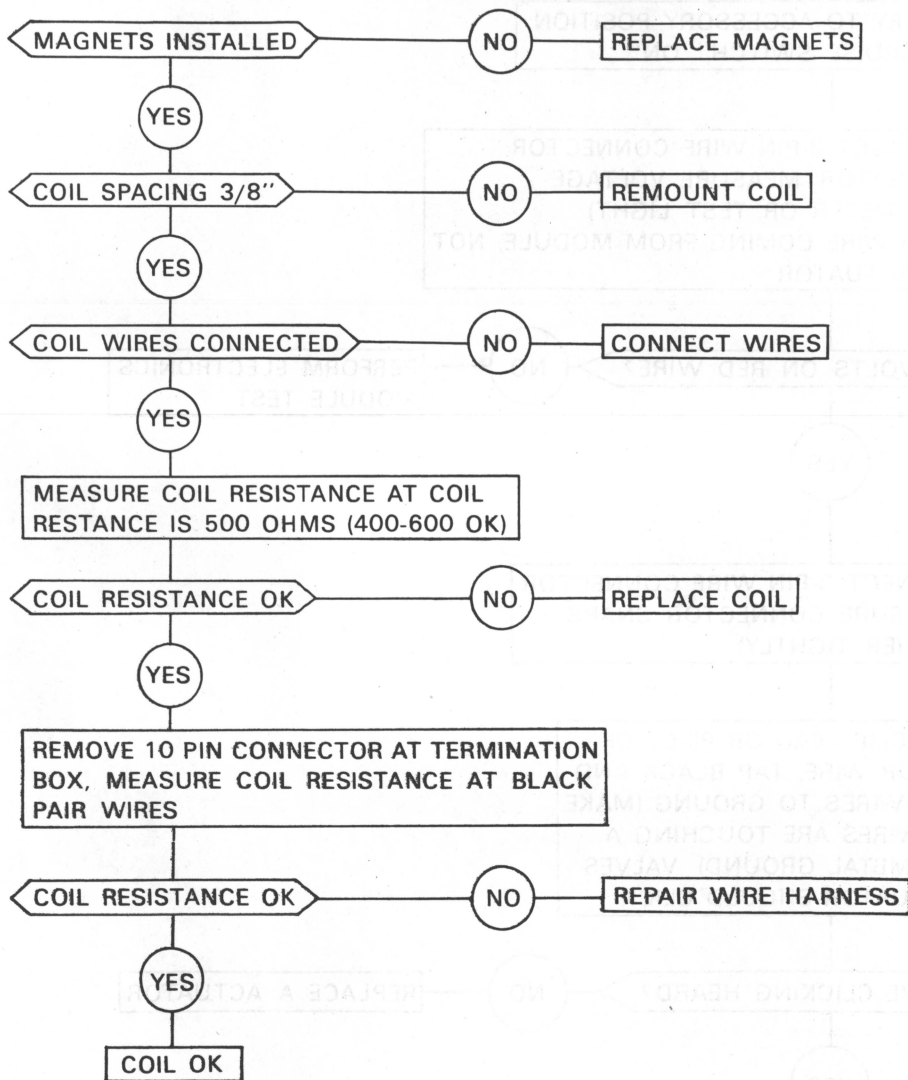
B) "ECS TEST"

Purpose: To determine if electronics module is receiving an ignition signal for proper ECS operation.



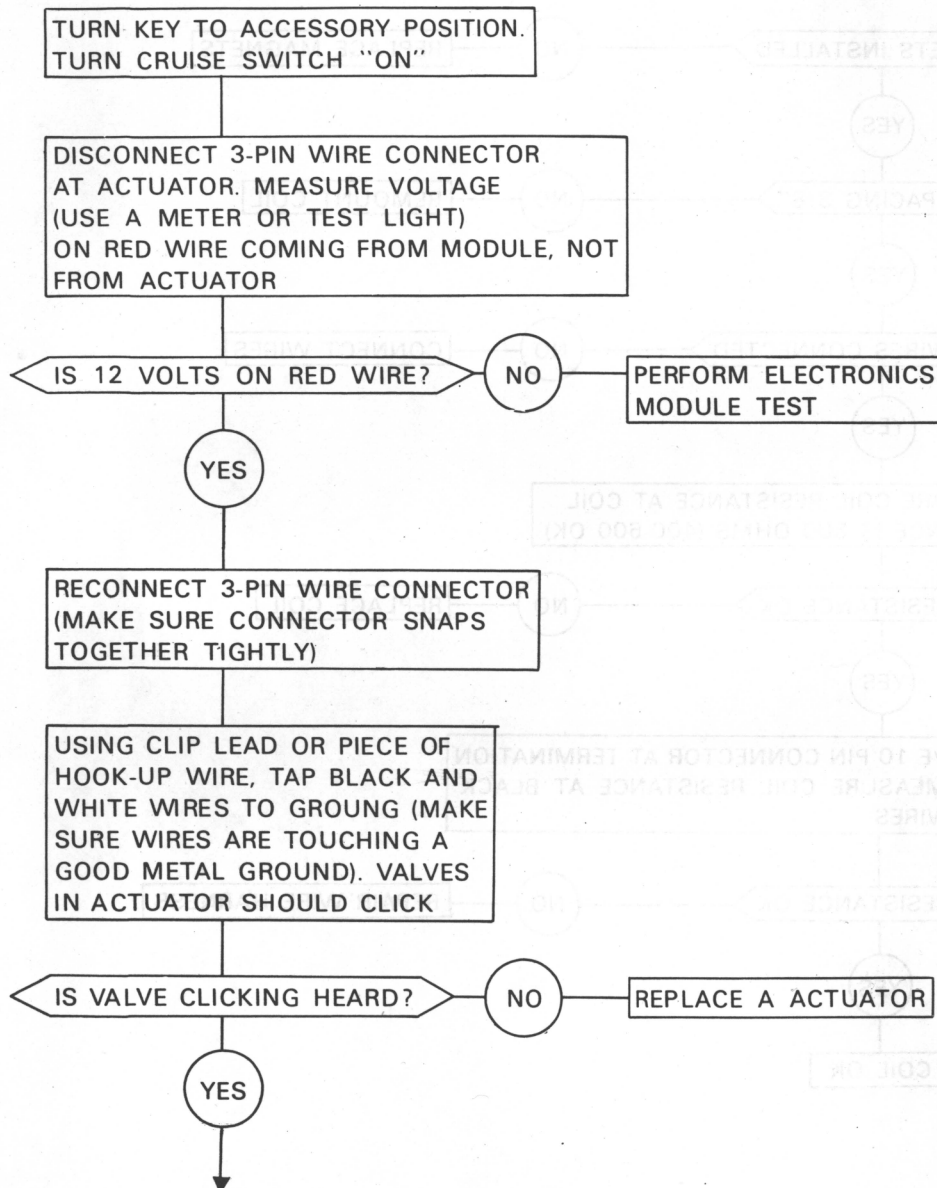
C) SPEED SENSOR TEST

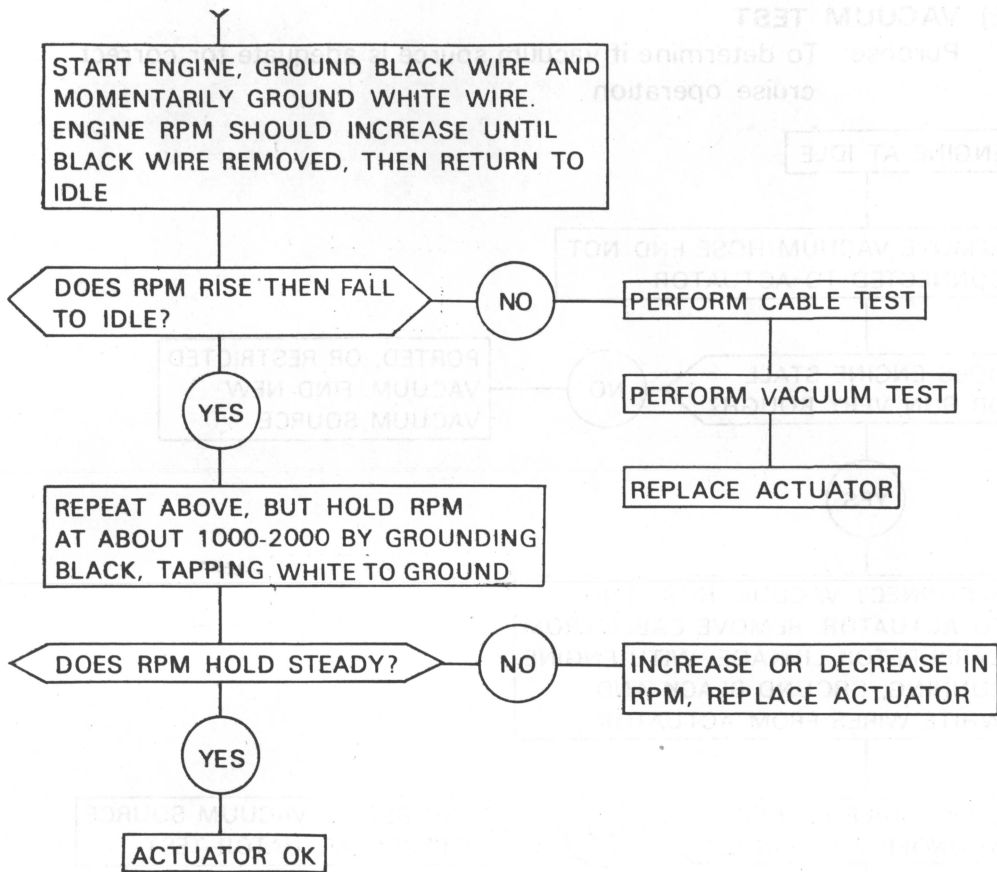
Purpose: To determine if electronics module is receiving an speed signal for proper speed control operation.



D) ACTUATOR TEST

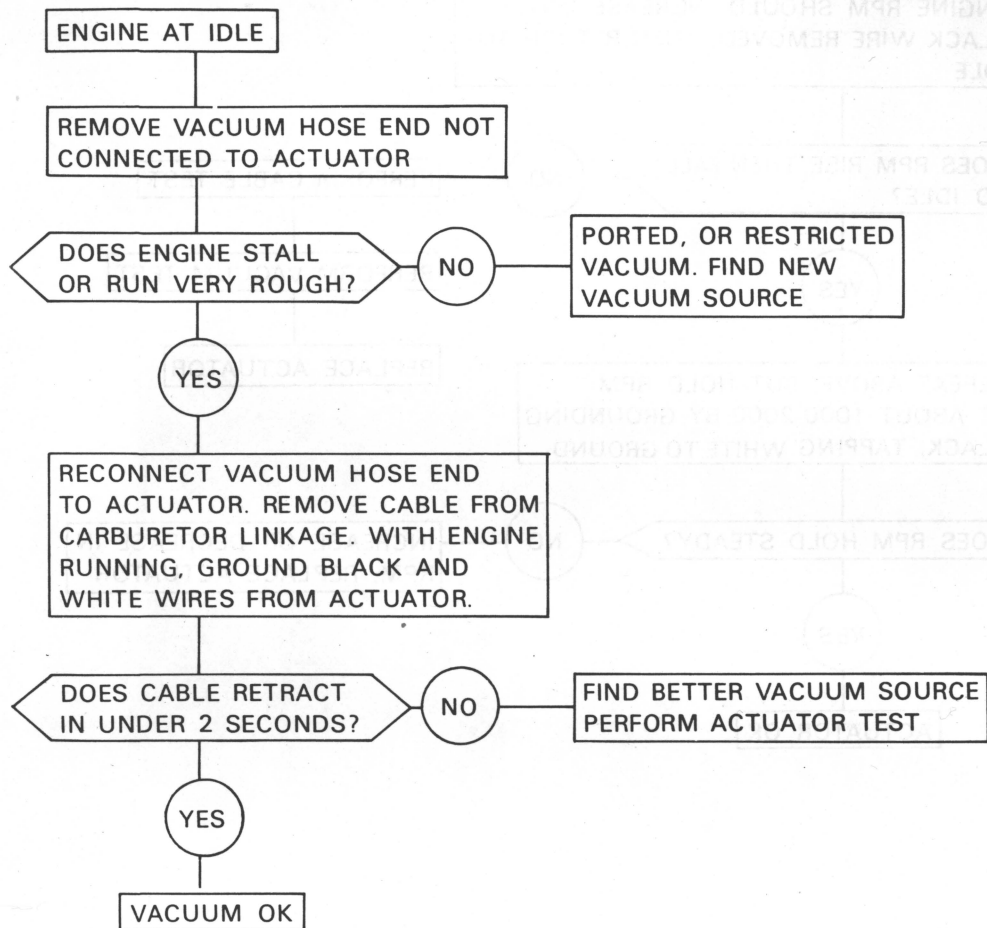
Purpose: To determine if throttle actuator (Servo) is functioning and wiring is correct.





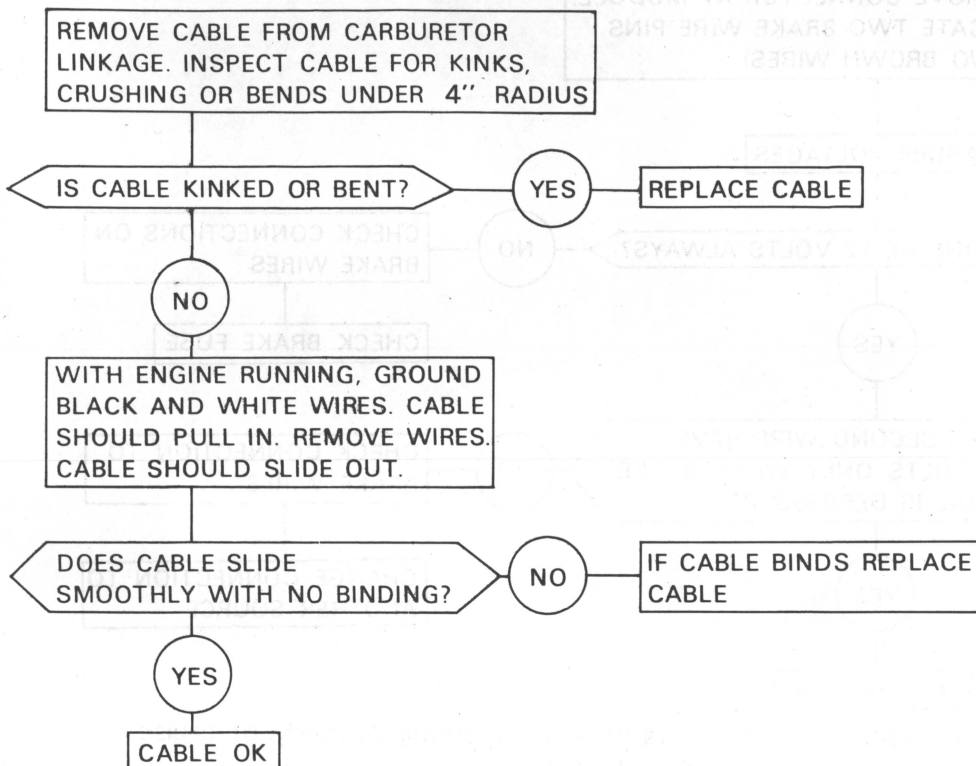
E) VACUUM TEST

Purpose: To determine if vacuum source is adequate for correct cruise operation



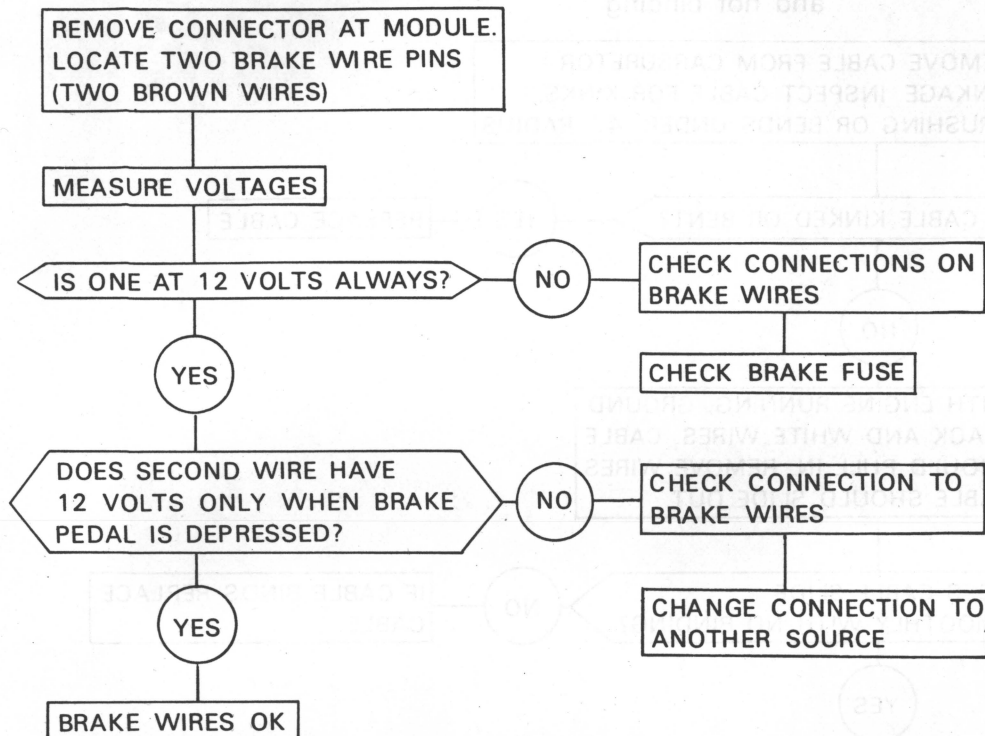
F) CABLE TEST

Purpose: To determine if actuator cable is installed correctly and not binding.



G) BRAKE WIRE TEST

Purpose: To determine if wiring to the brake switch is correct.



NOTE: Vehicle brake lights must be working properly or cruise will not engage. Check this first.

MEMO:

QMSW

MEMO:

MEMO

James Group, Inc.
San Ramon, CA 94583
Service Department, 10000
10000
10000
10000

Zemco Group, Inc.
San Ramon CA 94583
Service Department (415) 866-7266

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